

The relationship between the use of digital display devices and headphones and primary headaches in children

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Abstract

Background: Headache represents the most common neurologic symptom in children. In this study, we investigated the relationship between watching television, listening to music with headphones, smartphone, tablet, and computer use, and primary headaches in children. We aimed to determine whether primary headache in children is associated with excessive use of digital display devices and headphones and whether reducing the use of digital display devices and headphones affects primary headache. **Methods:** The study included 69 children with primary headaches and 64 with no headaches as a control group. All subjects were evaluated for demographic and headache characteristics and the use of digital display devices and headphones. Our recommendation for patients and families was to decrease the use of digital display devices and headphones, and the headache burden was re-evaluated after one month. **Results:** Headache frequency was more common in patients who watched television and used smartphones or tablets for more than 6 hours per day. Using a smartphone or tablet for more than 3 hours daily was more common in the study group than the control group. Headache frequency decreased in all patients one month after the digital imaging device and headphones were restricted. **Conclusions:** Watching television and using a smartphone or tablet strongly associates with primary headaches during childhood.

Keywords: Child. Headache. Screen time. Digital display device.

La relación entre el uso de dispositivos de visualización digital y auriculares y el dolor de cabeza primario en niños

Resumen

Introducción: La cefalea representa el síntoma neurológico más común en los niños. En este estudio se investigó la relación entre ver televisión, escuchar música con auriculares, el uso del teléfono inteligente o tableta y computadora y el dolor de cabeza primario en niños. Nuestro objetivo fue determinar la asociación entre la cefalea primaria en niños y el uso excesivo de dispositivos de visualización digital y auriculares, y el efecto de la disminución del uso de dispositivos de visualización digital y auriculares sobre la cefalea primaria. **Métodos:** El estudio incluyó a 69 niños con cefaleas primarias y 64 niños sin cefaleas como grupo control. Se evaluaron las características demográficas y de dolor de cabeza y uso de dispositivos de visualización digital y auriculares de los participantes. Se aconsejó a los pacientes y familiares que disminuyeran el uso del dispositivo de pantalla digital y los auriculares y se volvió a evaluar la carga de dolor de cabeza después de 1 mes. **Resultados:** La frecuencia de la cefalea fue más frecuente en los pacientes que veían televisión y utilizaban un teléfono inteligente o una tableta más de 6 horas al día. El uso de más de 3 horas al día fue más común en el grupo de estudio que en el

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grupo control. La frecuencia del dolor de cabeza disminuyó en todos los pacientes 1 mes después de la restricción del dispositivo de imagen digital y los auriculares. Conclusiones: Ver la televisión y el uso de un teléfono inteligente o tableta se asocian estrechamente con el dolor de cabeza primario en la infancia.

Palabras clave: Niño. Dolor de cabeza. Tiempo de pantalla. Dispositivo de visualización digital.

Introduction

Headache, the most common neurological symptom in the general population, including children, is recognized as a major source of morbidity in youth and results in missed days of school activities¹⁻³. Proper advice and treatment require consideration of a broad range of diagnoses, including different primary and secondary headaches⁴. Behavioral intervention is highly effective, particularly in treating pediatric headaches, and it can supplement or replace pharmacotherapy with the advantage of eliminating side effects and reducing costs⁵.

Social and new media are becoming increasingly important in the lives of pre-adolescents and adolescents⁶. Social media are interactive technologies that facilitate creating and sharing information, ideas, interests, and other forms of expression through virtual communities and networks⁷. New media is considered the multimedia and digital form of communication via desktop and laptop computers, phones, tablets, and other devices⁸. Children today spend an average of seven hours per day on entertainment media, including televisions, computers, phones, and other electronic devices⁹. Research has shown that traditional media (e.g., televisions, movies, and videos) impact most areas of public health. However, similar research on new media (e.g., smartphones, electronic tablets, and laptop computers) is still in its early stages^{6,10,11}.

Electronic screen usage, such as the internet, streaming television/videos, and interactive “applications,” has benefits and risks for children’s health. Benefits include knowledge, increased opportunities for social contact and support, and new opportunities for access to health promotion messages and information. Risks include adverse health effects on weight and sleep, exposure to false, inappropriate, or unsafe content and individuals, and compromising privacy and confidentiality¹². Torjesen¹³ reported that there is insufficient evidence to conclude that screen time harms the health of children and adolescents, and to determine screen time. Evidence of a direct ‘toxic’ effect of screen time is controversial, and evidence of harm is often overstated. Most of the existing literature has only examined television screen time¹⁴.

In this study, we investigated the relationship between watching television, listening to music with headphones, using smartphones, tablets, and computers, and primary headaches in children. We aimed to determine whether primary headaches in children are associated with excessive use of digital display devices and headphones and whether reducing the use of digital display devices and headphones has an effect on primary headaches. To the best of our knowledge, this would be the first study including patient follow-up on this topic in the literature.

Methods

The study included 69 children with primary headaches admitted between July 2018 and March 2019 to the Departments of Pediatrics and Pediatric Neurology, Faculty of Medicine, Necmettin Erbakan University. A control group comprising 64 age- and gender-matched children with no headaches who were admitted with non-specific symptoms to the Department of Pediatrics was also included. Primary headaches were diagnosed according to the diagnostic criteria set out in the third edition of The International Classification of Headache Disorders (ICHD-3)¹⁵.

Children with chronic diseases, anemia, hypothyroidism, low vitamin B12 levels, and secondary headaches were excluded from the study. As certain foods and food additives, such as caffeine, monosodium glutamate, and chewing gum, have been associated with headaches in children^{16,17} those participants with a history of chewing gum those who consumed foods and drinks with high levels of monosodium glutamate (e.g., potato chips) and caffeine (e.g., tea, coffee, chocolate) were also excluded from the study.

All subjects were evaluated for demographic characteristics, number of family members and siblings, residence (rural or urban), family income, and daily use of digital display devices and headphones. The family income status was assessed as low (< 300 USD monthly), middle (300-850 USD monthly), and high (> 850 USD monthly). Duration of electronic screen exposure was classified as 0-1 hour per day, 1-3 hours per day, 3-6 hours per day, or > 6 hours per day.

A questionnaire including questions about demographic characteristics and the use of digital display devices and headphones was administered to participants in both groups. Characteristics, duration (hours per day), and frequency (days per month) of headaches were reported from interviews with patients or their parents in the study group. The possible adverse effects of using digital display devices and headphones on children and adolescents were explained to the patients and families. Subsequently all subjects were advised to reduce screen time to < 1 hour daily, and the headache burden was re-evaluated after one month. Additionally, a detailed physical examination was performed on all subjects. Hemogram, kidney and liver function tests, serum vitamin B12, folate levels, and thyroid function tests were studied in all patients with headaches. Parents were contacted by phone one month later to ask if their children followed the restriction of digital imaging devices and headphones use and if headache frequency decreased compared to the first admission to the hospital. Any decrease in headache frequency was reported as a percentage (0-25%, 26-50%, 51-75%, or 76-100%). Decreased time in use of digital display devices and headphones was recorded as full compliance (decreased < 1 hour per day), 50% compliance (decreased but more than 1 hour per day), and noncompliance (no decrease).

Statistical analysis

The SPSS 21.0 software was used for statistical analysis. The Kolmogorov-Smirnov test was used to determine the normality of distribution. The Student's *t*-test and the Mann-Whitney *U* test were used for variables showing normal and non-normal distribution to compare differences between two independent groups. Pearson's correlation coefficient was used for variables showing normal distribution. Kruskal-Wallis H-test and χ^2 tests were used for variables showing a non-normal distribution. A *p*-value of < 0.05 was considered as significant.

This study was conducted according to the Declaration of Helsinki. Approval was granted by the Ethics Committee of Necmettin Erbakan University Faculty of Medicine (06/29/2018 No. 2018/1464). Informed consent was obtained from all participants and their parents.

Results

Of 133 participants, 69 patients had primary headaches, and 64 children were in the control group.

Demographic characteristics are shown in Table 1. Of 69 patients, 43 (62.3%) were diagnosed with migraine and 26 (37.6%) with tension-type headache. Of 43 children with migraine, 14 (32.5%) had chronic migraine, and eight (30.7%) with tension-type headache had chronic tension-type headache.

The distribution of type and usage time of digital display devices and headphones according to the study and control groups, gender, residence, family income, and headache type is shown in Table 2. No significant differences were observed between the study and control groups regarding the duration of watching television, listening to music with headphones, and computer use ($p > 0.05$); however, the use of a smartphone or tablet > 3 hours per day was more common in the study group than the control group ($p < 0.05$). No significant difference was found between the patients who lived in urban and rural areas regarding the duration of watching television, listening to music with headphones, smartphone or tablet use, and computer use ($p > 0.05$). The duration of watching television was longer in families with low and middle income than that of high income ($p < 0.05$). No significant difference was found between the patients with migraine and tension-type headache for the duration of watching television, listening to music with headphones, smartphone or tablet use, and computer use ($p > 0.05$).

The distribution of type of digital display devices and headphones and time of use according to age, duration, and frequency of headaches is shown in Table 3. We observed a significant correlation between time spent watching television and using a smartphone or tablet use age ($p < 0.05$). When compared by age group, more ≥ 14 -year-olds watched television for less than one hour per day, and more ≥ 13 -year-olds used a smartphone or tablet for more than 6 hours per day. Moreover, a significant correlation was also found between time spent watching television and using a smartphone or tablet and headache frequency ($p < 0.05$). Headaches were more frequent in patients who watched television and used smartphones or tablets for more than 6 hours per day.

Headache frequency decreased after one month in 59 patients who complied with the electronic screen restriction. Of these 59 patients, 35 (59.3%) had migraine and 24 (40.6%) had tension-type headache. The decreasing ratios of headache frequency were as follows: 0-25% in three (5.0%) patients, 26-50% in 21 (35.5%) patients, 51-75% in 13 (22.0%) patients, and 76-100% in 22 (37.2%) patients. The distribution of compliance status to restriction of digital display devices

Table 1. Demographic characteristics of the study and control groups

Characteristics	Study group (n = 69) n (%)	Control group (n = 64) n (%)	p-value
Gender			0.207
Male	27 (39.1)	32 (50.0)	
Female	42 (60.8)	32 (50.0)	
Age, years (mean ± SD)	12.3 ± 0.3	11.3 ± 0.3	0.062
Number of siblings (mean ± SD)	2.5 ± 0.1	2.9 ± 0.1	0.334
Number of family members (mean ± SD)	4.3 ± 0.1	4.7 ± 0.1	0.133
Residence			0.871
Urban	52 (75.4)	49 (76.6)	
Rural	17 (24.5)	15 (23.3)	
Family income			0.920
Low income	19 (27.4)	17 (26.5)	
Middle income	47 (68.1)	45 (70.3)	
High income	3 (4.3)	2 (3.0)	

SD: standard deviation.

and headphones according to the percentage of the benefit, age, gender, residence, and family income status is shown in Table 4. The benefit from the restriction was higher in those patients with full compliance than those with 50% compliance or noncompliance ($p < 0.001$). In addition, those who partially complied with the restriction on digital imaging devices and headphones were older children ($p < 0.05$).

Discussion

We examined the influence of digital display devices and headphones in children with primary headaches to determine whether primary headaches are associated with excessive use of these devices. Although television is still the dominant medium for children and adolescents, new technologies are becoming increasingly popular¹¹. The American Academy of Pediatrics is concerned about evidence of potentially harmful effects of media messages and images; however, some significant positive and prosocial effects of media use should also be acknowledged¹¹. Social media can bring benefits and risks to mental and physical health¹⁸. For example, prolonged sitting in fixed positions (when using a computer) may cause neck pain and headaches in adolescents¹⁹.

We found that children ≥ 13 years used more smartphones or tablets than younger children. We also found that children ≥ 14 years watched television less than 1 hour per day, and children ≥ 13 years used a smartphone or tablet more than 6 hours per day. Using a

smartphone or tablet > 3 hours per day was more common in the study group than in the control group. Headaches were more frequent in patients who used smartphones or tablets for more than 6 hours per day. With increasing age, new media use increased while TV viewing decreased. Headaches were more common in patients who watched television for more than 6 hours per day, and time spent watching television was longer in families with low and middle income than those of high income. However, no significant correlation was found between the time spent listening to music with headphones and computer use and age, headache duration, and headache frequency. We suggest that adolescents (> 13 -14 years) watch less television and use more smartphones and tablets because their social circle expanded.

A low level of physical activity combined with too much electronic media use, such as watching television, is commonly expected to be a risk factor for headaches²⁰. During early adolescence, time spent on screen-based activities contributes to reporting general physical complaints, particularly headaches, and backache. Differences in symptoms according to screen type have been documented²¹. Langdon et al.²² found that most adolescents reported that prolonged screen use (58.6%) and luminosity (brightness) (64.6%) worsened headaches, but no statistical difference was observed in the mean number of headache days per month. A small positive association was observed between increasing computer time, total screen hours, and school absenteeism. No statistically significant correlation was found

Table 2. Type and time of digital display devices and headphones use according to gender, residence, family income and headache type

Type and time (hours/day) of digital display devices and headphones	Groups		Gender		Residence		Family income			Headache type	
	Study group (n = 69) n (%)	Control group (n = 64) n (%)	Male (n = 27) n (%)	Female (n = 42) n (%)	Urban (n = 52) n (%)	Rural (n = 17) n (%)	Low (n = 19) n (%)	Middle (n = 47) n (%)	High (n = 3) n (%)	Migraine (n = 43) n (%)	Tension-type (n = 26) n (%)
Watching television											
0-1	17 (24.6)	18 (28.1)	9 (33.3)	8 (19.0)	12 (23.0)	5 (29.4)	5 (26.3)	12 (25.5)	0 (0.0)	9 (20.9)	8 (30.7)
1-3	28 (40.6)	31 (48.3)	9 (33.3)	19 (45.2)	19 (36.5)	9 (52.9)	6 (31.5)	22 (46.8)	0 (0.0)	19 (44.1)	9 (34.6)
3-6	21 (30.4)	15 (23.5)	9 (33.3)	12 (28.5)	18 (34.6)	3 (17.6)	5 (26.3)	13 (27.6)	3 (100)	12 (27.9)	9 (34.6)
> 6	3 (4.3)	0 (0.0)	0 (0.0)	3 (7.1)	3 (5.7)	0 (0.0)	3 (15.7)	0 (0.0)	0 (0.0)	3 (6.9)	0 (0.0)
p value	0.262		0.263		0.355		0.015			0.383	
Listening to music with headphones											
0-1	59 (85.5)	55 (85.9)	23 (85.1)	36 (85.7)	44 (84.6)	15 (88.2)	16 (84.2)	40 (85.1)	3 (100)	36 (83.7)	23 (88.4)
1-3	7 (10.1)	6 (9.3)	1 (3.7)	6 (14.2)	5 (9.6)	2 (11.7)	2 (10.4)	5 (10.6)	0 (0.0)	5 (11.6)	2 (7.6)
3-6	2 (2.8)	3 (4.7)	2 (7.4)	0 (0.0)	2 (3.8)	0 (0.0)	1 (5.2)	1 (2.1)	0 (0.0)	1 (2.3)	1 (3.8)
> 6	1 (1.4)	0 (0.0)	1 (3.7)	0 (0.0)	1 (1.9)	0 (0.0)	0 (0.0)	1 (2.1)	0 (0.0)	1 (2.3)	0 (0.0)
p value	0.746		0.090		0.787		0.965			0.795	
Smartphone or tablet use											
0-1	15 (21.7)	21 (32.8)	8 (29.6)	7 (16.6)	14 (26.9)	1 (5.8)	5 (26.3)	8 (17.0)	2 (66.6)	9 (20.9)	6 (23.0)
1-3	34 (49.2)	32 (50.0)	11 (40.7)	23 (54.7)	26 (50.0)	8 (47.0)	8 (41.6)	25 (53.1)	1 (33.3)	21 (48.8)	13 (50.0)
3-6	17 (24.6)	11 (17.1)	8 (29.6)	9 (21.4)	10 (19.2)	7 (41.1)	4 (20.8)	13 (27.6)	0 (0.0)	12 (27.9)	5 (19.2)
> 6	3 (4.3)	0 (0.0)	0 (0.0)	3 (7.1)	2 (3.8)	1 (5.8)	2 (10.4)	1 (2.1)	0 (0.0)	1 (2.3)	2 (7.6)
p value	0.043		0.231		0.154		0.295			0.658	
Computer use											
0-1	60 (87.0)	61 (95.3)	21 (77.7)	39 (92.8)	45 (86.5)	15 (88.2)	17 (89.4)	40 (85.1)	3 (100)	38 (88.3)	22 (84.6)
1-3	4 (5.7)	1 (1.5)	2 (7.4)	2 (4.7)	2 (3.8)	2 (11.7)	1 (5.2)	3 (6.3)	0 (0.0)	3 (6.9)	1 (3.8)
3-6	2 (2.9)	2 (3.1)	2 (7.4)	0 (0.0)	2 (3.8)	0 (0.0)	1 (5.2)	1 (2.1)	0 (0.0)	1 (2.3)	1 (3.8)
> 6	3 (4.3)	0 (0.0)	2 (7.4)	1 (2.3)	3 (5.7)	0 (0.0)	0 (0.0)	3 (6.3)	0 (0.0)	1 (2.3)	2 (7.6)
p value	0.201		0.196		0.388		0.895			0.682	

Table 3. Type and time of digital display devices and headphones use according to age, headache duration and frequency

Type and time (hours/day) of digital display devices and headphones	n	Age (years)		Headache duration (hours per day)		Headache frequency (days per month)	
		mean \pm SD	p-value	mean \pm SD	p-value	mean \pm SD	p-value
Watching television			0.015		0.473		0.017
0-1	17	14.2 \pm 0.5		2.7 \pm 0.6		13.2 \pm 2.3	
1-3	28	12.3 \pm 0.6		2.7 \pm 0.4		13.6 \pm 1.8	
3-6	21	10.7 \pm 0.6		3.8 \pm 0.8		8.8 \pm 1.5	
> 6	3	13.6 \pm 0.6		5.0 \pm 3.5		26.6 \pm 3.3	
Listening to music with headphones			0.072		0.526		0.061
0-1	59	12.0 \pm 0.3		3.2 \pm 0.4		11.9 \pm 1.1	
1-3	7	14.7 \pm 0.7		2.6 \pm 0.6		18.5 \pm 3.5	
3-6	2	12.5 \pm 3.5		0.5 \pm 0.0		3.0 \pm 1.0	
> 6	1	17.0 \pm 0.0		6.0 \pm 0.0		30.0 \pm 0.0	
Smartphone or tablet use			0.041		0.888		0.043
0-1	15	11.8 \pm 0.8		3.0 \pm 0.7		10.2 \pm 2.1	
1-3	34	11.8 \pm 0.5		3.2 \pm 0.5		11.7 \pm 1.5	
3-6	17	13.3 \pm 0.6		3.4 \pm 0.8		14.2 \pm 2.4	
> 6	3	16.0 \pm 0.5		1.8 \pm 0.1		26.6 \pm 1.6	
Computer use			0.319		0.757		0.170
0-1	60	12.1 \pm 0.4		3.2 \pm 0.4		12.2 \pm 1.2	
1-3	4	13.0 \pm 0.8		2.7 \pm 0.8		19.5 \pm 3.8	
3-6	2	14.5 \pm 1.5		0.7 \pm 0.2		3.5 \pm 1.5	
> 6	3	15.0 \pm 1.5		3.5 \pm 1.6		18.6 \pm 3.6	

SD: standard deviation.

Table 4. Restriction of digital display devices and headphones according to percentage of benefit, age, gender, statement residence, and family income status

Characteristics	Fully compliance (n = 34) n (%)	50% compliance (n = 25) n (%)	Non-compliance (n = 10) n (%)	p-value
Percentage of benefit (mean \pm SD)	75.7 \pm 2.9	47.6 \pm 3.4	32.0 \pm 8.5	0.000
Age, year (mean \pm SD)	11.7 \pm 0.5 ^a	13.6 \pm 0.4	11.5 \pm 1.1 ^a	0.048
Gender				0.737
Male	13 (18.8)	9 (13.0)	5 (7.2)	
Female	21 (30.4)	16 (23.1)	5 (7.2)	
Family income status				0.639
Low	8 (11.6)	8 (11.6)	3 (3.4)	
Middle	24 (34.7)	17 (24.6)	6 (8.7)	
High	2 (2.9)	0 (0.0)	1 (1.4)	
Residence				0.331
Urban	23 (33.3)	21 (30.4)	8 (11.6)	
Rural	11 (15.9)	4 (5.7)	2 (2.9)	

^ap < 0.05 with respect to group of partly compliant.

SD: standard deviation.

between the type or screen exposure time and monthly headache frequency, school attendance, or school performance.²² Alyoubi et al.²³ reported headaches in 51.1% of adolescents and young adults after an average

of 2.5 \pm 1.7 hours of active screen time (video games). The age of active screen time initiation was a significant factor for headaches; however, it was not significant for headaches after a specific duration of active screen

time in hours or days per week²³. Prolonged time spent at the computer (3 hours or more per weekday) have been associated with neck/shoulder pain and headaches in young adults²⁴. For all screen-based activities, headache increases according to time spent using screens²⁵. However, Smith et al.¹⁹ observed an association between neck pain and prolonged computer time for school students, although the prolonged time of computer use was not significantly associated with headaches. A significant association has been documented between listening to music with headphones and headaches in adolescents aged 13-17 years in another study²⁶. Unlike our study, in those studies, the presence of a chronic disease or consumption of foods such as caffeine and monosodium glutamate, which may cause headaches in children, were not examined. Therefore, these different results on the relationship between headaches and screen exposure could be related to these factors that may cause headaches in children and were not excluded from the other studies.

No significant difference was observed between patients with migraine and tension-type headaches for time spent watching television, listening to music with headphones, and using smartphones, tablets, and computers in our study. Andrade et al.²⁷ reported an association between excessive use of electronic devices and the presence of headaches in adolescents (14 to 19 years old), an habit considered a risk factor, especially for the development of migraine-type headaches. Playing videogames was the fourth most common trigger in children and adolescents with migraine²⁸. Mobile phone use was associated with a significantly increased prevalence of headaches/migraine with an adjusted odds ratio among 11-15-year-olds.

Children who regularly used mobile phones were also considered to have a worse health status than one-year earlier²⁹. In another series, total screen time and headache frequency was associated only in children with migraine and aura. In the migraine with aura group, children with more frequent headaches had over 2.5 hours more total screen time than those with less frequent headaches. No significant association between total screen time and headache frequency was found in the other headache groups, including migraine without aura, tension-type headache, mixed headache, and unclassified headache³⁰. Gautam et al.³¹ reported that children with migraine showed longer time spent on smartphones. However, no significant difference was found in the time spent on gaming and television. Montagni et al.³² reported that high levels of screen

time exposure were associated with migraine in young adults (mean age of 20.8 years and 75.5% females). In contrast, no significant association was found with non-migraine headaches. However, frequent computer use was associated with tension-type headaches and migraine in 13-year-old adolescents in another study³³. Tepecik Büyükbaş et al.³⁴ found that headache was triggered in 57.3% of patients with migraine and 40.2% of patients with tension-type headache by computer use ($p < 0.05$), and 55.3% of patients with migraine and 36.1% patients with tension-type headache by watching television ($p < 0.05$). However, the mean time (hours) of watching television per day at age 11 was not associated with migraine or tension-type headache in another series³⁵. Cerutti et al.³⁶ reported no significant relationship between students with and without headaches in the categories of internet and mobile phone abuse. In addition, the relationship between the two headache groups (migraine and tension-type headache) and media abuse was not statistically significant when the non-headache group was excluded. Moreover, no significant relationship found between headaches and internet and mobile phone addiction groups, and a significant relationship was found only when different types of headaches were considered³⁶. In the literature, conflicting results were reported between headache type and the use of digital display devices. While similar results were reported in our study, some studies showed that screen exposure triggered migraine-type and tension-type headaches.

We found that headache frequency decreased in all patients who complied with the restriction of digital devices and headphones. The decrease in headache frequency was higher in patients with migraine than tension-type headache. Due to differences in pathophysiological mechanisms underlying migraine and tension-type headache, the response to digital imaging devices and headphones restriction may differ. The benefit from digital display devices and headphones restriction was higher in patients with full compliance. By understanding and supporting media education, pediatricians can play an important role in reducing the harmful effects of media on children and adolescents³⁷. It is recommended to set age-appropriate limits that can be understood by the whole family and negotiated between parents and children. In addition, parents should establish clear consequences when these limits are not followed¹³. Picherot et al.³⁸ offered five simple ideas: understanding without demonizing; screen use in common living areas, but not in bedrooms; keeping time without digital devices (morning, meal, sleep,

among others); providing parental guidance for screen use; and preventing social isolation.

Our findings showed a strong association between increased screen time and headache burden in children. Furthermore, active intervention in the former positively affects the latter, suggesting a causal relationship. Therefore, we suggest that the restriction of digital imaging devices and headphones should be advised in children with migraine and tension-type headache before initiation of medical treatment. This study has some limitations. Firstly, a limited number of participants. Secondly, we asked about the restriction on screen use by phone during the follow-up of patients. This may have led to a bias for participants in conveying their compliance. Thirdly, the follow-up period was only one month. A longer observation period might have provided more valuable results.

In conclusion, primary headaches in children are associated with excessive use of digital imaging devices and headphones. Watching television and using smartphones or tablets have a role in primary headaches during childhood. Limiting screen time is important to reduce headache symptoms in children and adolescents. Further randomized controlled prospective studies with more participants and long-term follow-up should be conducted to evaluate the effect of the use of digital imaging devices and headphones on primary headaches in children.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author has this document.

Conflicts of interest

The authors declare no conflicts of interest.

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